

## CLAIMS

We claim:

1           1. A composition, comprising a mixture of  $\alpha$ -sulfofatty acid esters and having an  
2 enriched  $\alpha$ -sulfofatty acid ester concentration.

1           2. The composition of claim 1, wherein the mixture is enriched for C<sub>16</sub>  $\alpha$ -sulfofatty  
2 acid esters.

1           3. The composition of claim 2, wherein the C<sub>16</sub>-enriched  $\alpha$ -sulfofatty acid ester  
2 concentration is at least about 25 weight percent C<sub>16</sub>-enriched  $\alpha$ -sulfofatty acid ester of the  
3 total  $\alpha$ -sulfofatty acid esters.

1           4. The composition of claim 2, wherein the C<sub>16</sub>-enriched  $\alpha$ -sulfofatty acid ester  
2 concentration is at least about 35 weight percent C<sub>16</sub>-enriched  $\alpha$ -sulfofatty acid ester of the  
3 total  $\alpha$ -sulfofatty acid esters.

1           5. The composition of claim 2, wherein the C<sub>16</sub>-enriched  $\alpha$ -sulfofatty acid ester  
2 concentration is at least about 50 weight percent C<sub>16</sub>-enriched  $\alpha$ -sulfofatty acid ester of the  
3 total  $\alpha$ -sulfofatty acid esters.

1           6. The composition of claim 1, wherein the  $\alpha$ -sulfofatty acid esters are derived from  
2 natural fats or oils.

1           7. The composition of claim 1, wherein the  $\alpha$ -sulfofatty acid esters are methyl ester  
2 sulfonates.

1           8. The composition of claim 1, wherein the  $\alpha$ -sulfofatty acid esters comprise a first  
2 and a second  $\alpha$ -sulfofatty acid ester.

1           9. The composition of claim 8, wherein the first  $\alpha$ -sulfofatty acid ester is prepared  
2 from palm kernel oil, cohune oil or coconut oil, and the second  $\alpha$ -sulfofatty acid ester is  
3 prepared from palm stearine oil or tallow.

1           10. The composition of claim 8, wherein the second  $\alpha$ -sulfofatty acid ester comprises  
2 predominately C<sub>16</sub> chain lengths.

1           11. The composition of claim 8, wherein the first  $\alpha$ -sulfofatty acid ester comprises  
2 C<sub>8</sub>, C<sub>10</sub>, C<sub>12</sub>, C<sub>14</sub>, C<sub>16</sub>, and C<sub>18</sub> chain lengths and the second  $\alpha$ -sulfofatty acid esters comprises  
3 predominately C<sub>16</sub> chain lengths.



1           12. A detergent composition, comprising at least about 15 weight percent of a  
2 mixture of  $\alpha$ -sulfofatty acid esters and having a C<sub>16</sub>-enriched  $\alpha$ -sulfofatty acid ester  
3 concentration.

1           13. The detergent composition of claim 12, wherein the mixture comprises a first  $\alpha$ -  
2 sulfofatty acid ester comprising C<sub>8</sub>, C<sub>10</sub>, C<sub>12</sub>, C<sub>14</sub>, C<sub>16</sub>, and C<sub>18</sub> chain lengths and a second  $\alpha$ -  
3 sulfofatty acid ester comprising predominately C<sub>16</sub> chain lengths.

1           14. The detergent composition of claim 13, wherein the second  $\alpha$ -sulfofatty acid ester  
2 comprises at least about 35 weight percent C<sub>16</sub> chain lengths.

1           15. The detergent composition of claim 13, wherein the second  $\alpha$ -sulfofatty acid ester  
2 consists of C<sub>16</sub> chain lengths.

1           16. The detergent composition of claim 12, wherein the mixture of sulfofatty acid  
2 esters comprises methyl ester sulfonates.

1           17. A detergent composition, comprising at least about 35 weight percent of  $\alpha$ -  
2 sulfofatty acid esters, comprising:  
3           a first  $\alpha$ -sulfofatty acid ester comprising a mixture of different chain lengths; and  
4           a second  $\alpha$ -sulfofatty acid ester comprising at least about 35 weight C<sub>16</sub> chain lengths.

1           18. A composition, comprising:  
2           about 60 to about 40 weight percent methyl ester sulfonate comprising a mixture of  
3 chain lengths; and  
4           about 40 to about 60 weight percent methyl ester sulfonate consisting essentially of  
5 C<sub>16</sub> chain lengths.

1           19. A method for making a detergent composition, comprising:  
2           providing a mixture of  $\alpha$ -sulfofatty acid esters with a C<sub>16</sub> enriched concentration; and  
3           combining the mixture of  $\alpha$ -sulfofatty acid esters with at least one other detergent  
4 component.

1           20. The method of claim 19, wherein the  $\alpha$ -sulfofatty acid esters comprise methyl  
2 ester sulfonates.

1           21. The method of claim 20, including providing the mixture of  $\alpha$ -sulfofatty acid  
2 esters by providing a methyl ester feedstock and then sulfonating the methyl ester feed to  
3 make the methyl ester sulfonates.

1           22. The method of claim 21, including sulfonating the methyl ester feedstock by  
2 reacting the methyl ester feedstock with gaseous SO<sub>3</sub>.



1           23. The method of claim 21, wherein the methyl ester is prepared from a natural fat  
2 or oil.

1           24. The method of claim 21, further comprising enriching the C<sub>16</sub> content of the  
2 methyl ester feedstock.

1           25. The method of claim 21, further comprising combining a natural fat or oil and a  
2 enriched natural fat or oil to form the methyl ester feedstock.

1           26. The method of claim 25, including combining about 60 to about 40 weight  
2 percent of the natural fat or oil with 40 to about 60 weight percent of the enriched natural fat  
3 or oil.

1           27. A method for making a detergent composition, comprising:  
2 providing a methyl ester feedstock containing methyl esters having a C<sub>16</sub> enriched  
3 concentration;  
4 sulfonating the methyl ester feedstock to obtain methyl ester sulfonate; and  
5 combining the methyl ester sulfonates with at least one other detergent component.

1           28. The method of claim 27, the methyl ester comprising a first natural fat or oil  
2 comprising a mixture of chain lengths and a second natural fat or oil comprising  
3 predominately C<sub>16</sub> chain lengths.

1           29. The method of claim 27, further comprising enriching the C<sub>16</sub> content of the  
2 second natural fat or oil by removing at least some of the non-C<sub>16</sub> chain lengths.